S
628.05
W3b
WINTER 1980
c.2

Big Sky Clearwater

VOL. X WINTER ISSUE 1980 NO.4

STATE DOCUMENTS COLLECTION

DEC 31 1980

MONTANA STATE LIBRARY
930 E Lyndale Ave.
Helena, Montana 59601

PLEASE RETURN

On the Road

Water-plant operators help train a training officer

Montana State Library
3 0864 1006 7338 6

Operators help train a training officer

Towns, bureau work together to solve some plant problems

By Denise Osterman
WQB Training Officer

AS 1980 DRAWS to a close, I've been given a chance to reflect on my travels to some of Montana's water-treatment plants during the year. I make these visits for two reasons: (1) to be of any help I can to operators having problems in their plants, and (2) to learn for myself how operators are solving some of those problems. I may be a training officer, but I've still got plenty to learn from operators who've been at their jobs for years.

There are many types of water plants throughout Montana -- all, theoretically, designed to effectively and efficiently treat water to meet drinking-water standards. Well, some of the plants just weren't doing it because of problems cropping up in some combination of three major areas: administration, plant design, and operation and maintenance.

I present to you now four of those plants and the problems each is experiencing. And I hope -- since you'll be aware of the problems some other operators run into -- you can prevent the same from happening at your plant.

Turbidimeter brought to life

Town A is small (population 100). But it has two big problems. First, its part-time water-plant operator is inexperienced. And he also works on another full-time job for the town. When the town found that its "automated" plant needed someone to watch over it, this man volunteered and, under the circumstances, has done a very good job. Second, the town must draw its water from an extremely muddy creek; it cannot reach any good groundwater.

Town A purchased the small package plant 10 years ago. They used to add alum and chlorinate, but stopped adding alum to save money. The real saving grace is a 15-million-gallon-capacity settling reservoir allowing the raw water about 250 days of settling in the summer and about 1000 days in the winter. Because of the long holding time, the settled raw water entering the plant is of relatively low turbidity. But during the time the water was being directly filtered (because alum wasn't being used as a coagulant), the town didn't know if turbidity requirements were being met. Town A did not have a turbidimeter. And the state was insisting on being furnished with Town A's turbidity data.

So the town council voted to buy their operator a turbidimeter. But the one that arrived in the mail lacked clear instructions on use and calibration. I brought the turbidimeter back to the Water Quality Bureau and, with the help of our chemistry lab, got it calibrated. The machine, now usable, showed the average turbidity of the finished water to be greater than 1 NTU -- which means that Town A must use some other treatment in addition to filtration.

I'm going back to Town A where the

The Big Sky Clearwater is published quarterly by the Water Quality Bureau of the state Department of Health and Environmental Sciences for water and wastewater treatment operators in Montana.

Editor -- Charles Wood   Graphics -- Eric Weber

Typist -- Betty Boeckel

operator and I will run jar tests (see story on Page 4) to find the proper range of chemical dosages needed to obtain a top-quality finished water. We'll experiment with alum and with a coagulant aid and a filter aid (see story on Page 5).

Answers for cold, cold water

Town B (pop. 4,000) has a conventional water-treatment plant that's very well run. It was designed to produce 5 million gallons per day (mgd), but so far has only had a 1 mgd average. Because the plant was designed to treat about five times as much water as is normally required, the operator just slows down the whole plant allowing a much longer settling time during periods of high turbidity. Because of this option, the operator has not had to rely on a coagulant aid or filter aid to meet turbidity requirements.

The operator, however, posed this question to me: "What happens to other towns in the early spring when the water is very turbid, very cold and the plant can't be slowed down?" He knew, of course, that it becomes difficult to get powdered alum into solution in very cold water. When the feeder pump is set as high as possible, he said, the required alum dosage is too high to allow proper dissolving.

We discussed two options. First, the use of liquid alum might help. Second, the operator might try a coagulant aid or a filter aid during such periods to reduce the amount of alum needed. Sometimes the plant's use of a coagulant aid along with the alum will cut the alum dosage that's required by as much as 40% to 60%, enabling this lesser amount to mix into solution.

Again, Town B is a case where the operator has the perfectly acceptable alternative of slowing his plant down to settle out the turbidity. But it's also a case of an operator who's perfectly willing to pass some of his knowledge on to other operators (and training officers) who don't have that option.

Having to live with high pH

Town C (also pop. 4,000) has a water plant where the three major stages of chemical treatment (rapid mix, slow mix and sedimentation) are occurring in a single tank, often called a Sludge Blanket or a Solids Contact Clarifier. Treatment chemicals fed into the rapid mixer are: lime and soda water from a well for softening, alum and a flocculant aid for settling out turbidity, phosphate for corrosion control, and activated carbon for removing tastes from the water.

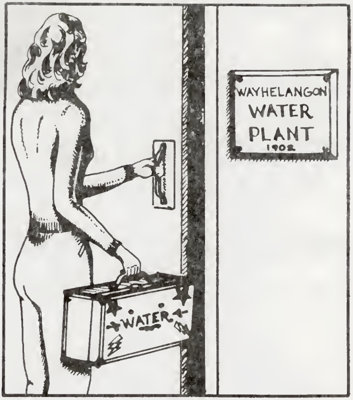
The raw water turbidity on the day of my visit was a high 108 NTU. The operator was feeding only 14 parts per million (ppm) alum, .02 ppm flocculant aid, and 87 ppm lime. The operator was producing a good-quality finished water (.09 NTU) while using minimal amounts of treatment chemicals.

Normally, this plant uses CO_2 to reduce the high pH resulting from lime-soda softening. But due to safety reasons, the recarbonation unit has been shut down. Until a new unit is operational, the treated water will be higher in pH than is normally recommended. CO_2, by lowering the pH of a softened water, serves to change the insoluble hardness back to a soluble form. This keeps the insoluble form from precipitating out in the distribution pipelines.

A need for fine-tuning

I arrived in Town D with Dayton Alsaker of the Water Quality Bureau's Billings office. The operator there had been having trouble getting his chemical feeding right. His experimental methods were not yielding the best possible results, so the three of us put our heads together to see if we could remedy the situation.

At this plant, the operator had turned up the alum feeder each day because the turbidity of the finished water was increasing. The alum floc was not settling well, nor was it filtering out very well. Floc that does not settle well is carried over to the filters, causing unnecessary loading. After figuring out that the alum dosage was too high, the operator and I set out to run jar tests to confirm it. Alum works best at a pH of about 7.0 to 7.5. But alum's an acid salt,



and using too much of it may lower the pH below this effective range. If the pH is lowered too much, a chemical -- such as lime -- would have to be added to raise it again. (And remember that all chemical additions cost money).

It appeared that the use of a polymer possibly could improve plant operation and cut down on the amount of alum used.

We proceeded to run several sets of jar tests, each time changing one variable. For example:

#1 - alum only
#2 - alum + .5 ppm Nalco 8101 (cationic)
#3 - alum + .5 ppm Nalco 8102 (cationic)
#4 - alum + .5 ppm Separan (nonionic)

After running these sets, we doubled each polymer addition (leaving the alum dosage the same) and ran each series again. For this particular raw water (turbidity = 70 NTU, pH = 8.2, temp. = 18 degrees C) we found that 25 ppm alum along with .5 ppm Nalco 8102 gave us the best jar-test results: settled turbidity = 4.5 NTU, filtered turbidity = .25 NTU, pH = 7.05).

One word of caution: when feeding a liquid polymer, it is necessary to feed a dilute solution (usually 1%) and since Nalco 8102 is a cationic coagulant aid, it should be fed into the plant where it receives as much mixing with the raw water as possible.

The filters also were giving Town D's operator a headache. He was backwashing at a rate that was probably not adequate to get them very clean. Well-cleaned filters should produce water with a lower turbidity than filters that aren't backwashed properly.

Dayton suggested he backwash by (1) opening the valve slowly and then shutting it slowly at the end of the backwash period, (2) letting the filter sit for at least 30 minutes before using it again, and then (3) begin filtering at a slow rate, gradually increasing it up to normal. In determining the length of a filter run, we agreed, you should consider two things: loss of head on the filter, and the turbidity level of the filtered water. Ideally, if treatment chemicals are being added in correct proportions, the head loss through the filter should peak at the same time that filtered-water turbidity begins to increase (called breakthrough). If the head loss peaks first, too much floc is being carried over to the filters, either from feeding too much chemical or from inadequate settling. If breakthrough occurs first, not enough chemical is being added and the floc is too fragile to be removed adequately by the filter. Fragile floc also can be a problem when alum is fed by itself (without a coagulant aid).

Filtration rates should be reduced during the winter because cold water is more viscous than warmer water. A colder, more viscous water can easily shear the floc bridges that develop between filter media particles. Because of the same principle, backwash rates also should be reduced during the winter.

IN THESE FOUR MONTANA TOWNS and in others I've been to, the operators are running into trouble either because they have antiquated or poorly designed plants, or because they've been given inadequate or improper technical guidance. In many cases, the operators have little control over these two factors.

Hard pressed city finances are the

culprit. And many operators I've met tell me they feel alienated from the city fathers who control the purse-strings.

"They don't understand why any money needs to be spent on a water plant at all," I'm told time and again. Town A, of course, is a good example. First, the town just can't afford to hire an experienced full-time, certified operator. Second, they can't really understand why such an operator is required when the company that sold the plant dwelled so much on the word "automated."

It's becoming very difficult for an operator to convince city hall (which is in another world socially as well as physically) that certain changes, replacements, additional chemicals, etc. may be needed for the operators to do the best job possible -- that is, treating the water effectively (meeting minimum health requirements) and efficiently (at the least possible cost).

Using jar tests to determine dosages

By Denise Osterman
WQB Training Officer

The characteristics of raw water vary daily. These variations dramatically affect the treatment processes at the water clarification plants I've visited. And these variations add to the complexity of a water-plant operator's job. However, by using a technique called the Jar Test the operator can determine the most effective --and the most cost-effective -- chemical treatment to use for his particular raw water.

Many of the chemicals added to a water supply can be evaluated on a laboratory scale by means of jar tests. Among the most important of these chemicals are coagulants, coagulant aids, alkaline compounds, softening chemicals and activated carbon for taste and odor removal. Remember that a jar test only will indicate the dosage range, while the final operating dosage levels must be determined "in-plant."

How should jar tests be conducted?

1 You will need a typical jar-test apparatus. It usually consists of a variable-speed (10 to 100 RPM) stirring machine (see illustration) with six paddles, six 1500-ml beakers, and an illuminated stand. You'll also need a large sampling bucket, several 1-, 5-, and 10-ml pipettes graduated in 0.1 ml increments, and, of course, standard solutions of the chemicals to be tested.

Stirrer for Jar Test

2. Always collect a fresh sample of raw water and add one liter (1000 ml) to each of the six 1500-ml beakers. Place the stirring device into each beaker.

3. Beginning with the first jar to the left, add the coagulant (or other chemical). Increase the dosage from left to right so that the first jar is likely to represent undertreatment and the last jar overtreatment. *If reagents are made up at a concentration of one gram per liter (0.1%) then 1 ml of this solution added to one liter of the raw water sample would equal one part per million. If the operator wishes to obtain dosage results in grains per gallon, then the reagents should be made up at a concentration of 17.1 grams per liter (of distilled water). Each 1 ml of this solution represents a dosage of one grain per gallon when added to one liter of raw water.* All six jars should be dosed simultaneously. Since this, obviously, is a six-handed job, come as close as you can with the number of hands available. You may consider using a strip of wood onto which several vials have been taped, allowing them to be dumped simultaneously.

4. Flash-mix the samples, using a high RPM setting that is reasonably representative of your actual plant flash-mix capability. The time of flash-mixing should be equal to the actual plant conditions. A typical flash-mix period may be for 20 to 30 seconds at 80 to 100 RPM.

5. Begin slow mix -- again, try to simulate plant conditions. A representative slow-mix time may be 15 minutes at 20 to 30 RPM. Observe and record floc formation. Note the beaker or beakers in which floc development seems rapid, strong and well-defined.

6. Turn off the stirrer and allow samples to settle -- usually 15 to 60 minutes, depending on each specific plant.

7. Carefully withdraw the clear supernatant and test for color, turbidity, pH and alkalinity.

It will be necessary to run additional series, varying chemical combinations and dosage levels, making certain that only one variable is changed at a time in a given beaker. Remember that the objective of this exercise is to provide the highest level of treatment needed at the least possible cost. If this means changing some of the test procedures to best suit your particular situation, then change them. Good luck.

How to use polymers as coagulant aid

By Denise Osterman

AN IMPORTANT ASPECT of optimizing the performance of water plants may involve the use of a coagulant aid. Polyelectrolytes (synthetic polymers) represent one such coagulant aid.

Although the use of polymers is fairly widespread, I feel that the salesmen of such products have not always provided enough information about obtaining the maximum benefits from them. The following discussion of polymers will, therefore, examine their purpose and proper usage.

In order to discuss recent improvements to the process of water clarification, it is first necessary to define two terms. Coagulation refers to the process by which negatively-charged colloids are neutralized so that their charge is not strong enough to prevent particle collisions. Flocculation is the bonding and agglomeration of these neutralized particles into larger units that are then removable by sedimentation and filtration.

The reason that alum and iron salts have been used so widely is that they function both as coagulants and flocculants. For example, their cationic (positive) charge will neutralize negative colloid charges. Also, the polymeric structures that form -- as these salts become insoluble -- provide an efficient bridging mechanism.

Polymers are defined simply as a series of repeating chemical units, making up a molecule. There are three predominant types of synthetic polymers used in municipal water treatment:

Polymer charge type	Molecular weight class	Primary function
Cationic (+)	Moderate	Coagulant (neutralization)
Nonionic	Very high	Flocculant (bridging)
Anionic (-)	Very high	Flocculant (bridging)

THE FIRST CLASS of polymers -- the cationics -- exhibit a very high charge density and is used as a primary coagulant. These polymers function as "charge neutralizers." For highly turbid waters, this means a more efficient means of neutralizing the tremendous charge demand.

High turbidities require a greatly increased alum dosage to

Well, at least take some time off for lunch

Joe Jacques, one of the operators at the Helena Wastewater Treatment Plant, recently was guiding a group of elementary-school students around the facilities when he remarked, jokingly, "If you kids all stopped going to the bathroom, I wouldn't have a job anymore."

To that, a very concerned 8-year-old girl replied, in all seriousness, "Oh, Mr. Jacques, I'll never stop going to the bathroom. I promise!"

neutralize the large amount of colloidal charge present. The large alum addition will lower the pH to a point where alum becomes less insoluble. For low-alkalinity waters, this is even more of a problem since alum will not hydrolize to its insoluble species without sufficient alkalinity. In this instance, the use of a cationic polymer will help provide neutralization without affecting pH.

When water of low turbidity is encountered, several special factors must be taken into consideration. Since fewer particles are present, the rate of interparticle collisions is reduced. This requires a greater amount of mixing to accomplish the desired flocculation. Low turbidity also causes a reduction in the number and size of particles (and concern to operators who are not accustomed to seeing fine floc). Low turbidity can also give rise to higher alumina carryover. To help eliminate this problem, the use of a cationic polymer as an in-line filtration aid is desirable.

THE SECOND MAJOR GROUP of synthetic polymers -- the high molecular- weight flocculant - - may be either nonionic or anionic in varying degrees. For practical purposes, they function by similar means and require jar testing to determine the proper fit. Primarily these products provide a bridging mechanism to enhance large floc growth, once the particles have been neutralized by coagulants. These high molecular-weight flocculants do not provide functional charge neutralization.

In general, these flocculants can reduce carryover of floc caused by low densities or excessive throughput, can reduce alumina carryover by requiring less alum, and can be used as filter aids. When used as flocculants to reduce carryover, they are normally fed into the rapid mix following the addition of a coagulant. When using a high molecular-weight polymer, flocculation can be hindered or even totally inhibited if it is not used in a sufficiently dilute solution. It may also happen if the polymer solution is not quickly dispersed into the water by rapid mixing.

In addition to their use as flocculants to aid in settling, the high molecular-weight polymers can be used as filter aids. Problems associated with this application have primarily been a result of chemical overfeed. Normal application dosages range from .02 to .06 ppm.

Functionally, the high molecular-weight polymers serve to increase the floc strength and, thereby, prevent floc breakup in the filter due to hydraulic shear. They work primarily at the filter surface by improved straining.

The cationic polymer can also be used as filter aids, although their required dosage will be higher.

IN SUMMARY, I would suggest that plant operators, when considering using polymers, read the available literature and discuss their application with experienced operators in order to prevent misuse. When synthetic polymers are used, it is necessary to investigate the optimum feed points so that they can function with the greatest possible efficiency. These synthetic products have many desirable characteristics. If used properly, they can significantly improve water-clarification methods.■

The glory and the gaffe

Operator praised for heading off herbicide

From Illinois EPA's
Environmental Progress

AN ALERT WATER-PLANT OPERATOR in Illinois cut off about 500 gallons of herbicide "at the pass" before it ended up in glassfuls of drinking water in two small Illinois towns last May.

Charles "Dink" Peters, certified public water supply operator for Flora and Zenia, Ill., noticed a deep yellow color in the water entering the treatment plant. Peters took samples, halted the flow of water leaving the plant, and immediately flushed the raw and treated water before allowing any water to enter the distribution system leading to residents' homes. The tests showed the contaminant to be a herbicide.

The main line between the Little Wabash River and Flora's treatment plant has off-shoot lines carrying raw water to nearby farms. It's believed that one of these lines was used to dilute a tank of herbicide. A reverse flow of water and herbicide into the main line could have been triggered by shutting off the automatic raw water pumps.

Since herbicides are among the dangerous contaminants that can't be removed fully through normal plant operations, Peters' quick action of shutting off the flow and flushing the system is credited with preventing a severe health problem.

Worker gets undeserved jab for foul water

A MONTANA WATER WORKER, however, became the scapegoat for a water foul-up that just as easily could be blamed on his superiors within the city government.

Foul-tasting and foul-smelling water began flowing from Helena faucets on Sept. 6 soon after water was released into the city's lines from Chessman Reservoir. The bad water remained in the city lines almost a month and the city received 50 to 60 complaints from homeowners each day. Before the ruckus died down, a water-department worker was named in the Helena newspaper as the person who caused the problem. City officials had told reporters that the employee had forgotten to close a valve at the reservoir, allowing muddy water at the initial opening of the reservoir to enter the distribution system. Had the employee left the valve closed until the water began running clear, the city claimed, the mess never would have occurred.

Not true, said the Water Quality Bureau after the city asked it to look

The glory and the gaffe

into the foul-up. The bureau found that the city had failed to give enough copper-sulfate treatment to algae in the reservoir earlier in the summer. As a result, an algae bloom occurred in July. The water was full of residual matter from that bloom when the reservoir was opened. The Chessman water tasted sweet and pure to the men manning the reservoir, but chlorine added several miles down the system reacted with the decaying algae and made the water taste and smell terrible. The timing of the valve opening had nothing to do with it.

The Water Quality Bureau feels the blame should be shared by several layers of city government and not given to a single employee in the field. "The city should have known how much treatment to give the algae," said the bureau's Abe Horpestad. "The former city manager had failed to give clear responsibility to a single person to make sure the job got done right. There have been no training programs within the city's water department -- not even bull sessions among employees in which knowledge could be traded."

Helena's new city manager is trying to change all that. He's getting water workers involved in training programs, is encouraging more department communication, and has gotten the wastewater-treatment lab to keep an eye on the Chessman algae.

However, the water employee continues to shoulder the blame. The newspaper has not set the record straight. All the public knows is that he had been reprimanded by the city manager and ordered to pay -- along with the city manager, public-utility director, and water-pumping supervisor -- the cost of a written apology to Helena residents. An apology for the valve, not for the algae.

If you don't tell 'em, the bureau will

WQB enforcing notification rules for suppliers

The Department of Health and Environmental Sciences (DHES) has begun a program to enforce the EPA requirement that water suppliers give public notice whenever something goes awry with the supply, the supplier fails to monitor the supply, or a variance is granted.

So far, the department has mailed news releases to newspapers in three communities notifying the public that suppliers there had failed to monitor the water supplies. The releases also stated that the suppliers had failed to notify the public.

According to Rule 16-2.14(10)-S14381 (the state's public water supply regulations), water suppliers must notify the public when their systems: (1) violate maximum contaminant levels, (2) are not treated with prescribed techniques, (3) are granted a variance, (4) fail to comply with a variance schedule, or (5) are not monitored by the supplier with proper testing procedures. Besides notifying DHES within 48 hours of such occurrences, a community supplier is required to issue a notice to its users with the next water bill or by some other written notice if the water bill is only issued quarterly or not issued at all. If the community supplier fails to comply with a maximum contaminant level, he must give other public notice in a manner approved by DHES. This could include a newspaper ad or a press release.

A non-community supplier is required to give notification about any of the above occurences in a "conspicuous" manner approved by DHES. "They can post a notice at the door of a bar or a restaurant or on a campground bulletin board," said Rick Rosa, sanitary engineer for the Water Quality Bureau.

The supplier -- whether community or non-community -- then has 10 days to send DHES a copy of the public notice. If he doesn't, the Water Quality Bureau sends out the news release, informing the public and emphasizing that the supplier failed to follow the notification rules. "We assume that public pressure will then help bring the supplier back into compliance," Rosa said.

Operators' Certification Corner

SAMPLE CERTIFICATION TEST QUESTIONS

1. ________________ motors have very low starting torque, operate at a constant speed, and are often used in timing devices.

2. ________________ motors require only a small amount of current to start, can start under a heavy load and can run at variable speed.

3. The amount of chlorine which remains in solution after the organic and inorganic reducing compounds have been oxidized is the ________________.

4. Gas chlorine leaks can be detected by holding a rag soaked in ________________ near the suspected leak. A ________________ will form if chlorine is leaking. Liquid ammonia applied directly to a chlorine leak will ________________ the leak.

5. Parasitic bacteria that produce products that harm the organism they inhabit are called ________________ bacteria.

6. Escherichia Coli are (pathogenic, nonpathogenic) bacteria that ared used as indicator organisms in the ________________ test.

7. A dual cylinder positive displacement piston pump has a stroke of 4.78 inches and piston diameter of 4.8 inches. The pump is coupled to a variable speed motor equiped with a tachometer. You wish to use this pump to fill a tank 30 feet in diameter to a height of 11 feet during an eight hour shift. What speed setting would be required on the pump (in revolutions per minute) to accomplish this task?

ANSWERS

1. Synchronous
2. Induction
3. Residual
4. Ammonia, white cloud, worsen
5. Pathogenic
6. non-pathogenic, Fecal coliform

7. Area of a cylinder = $\pi R^2 \times H$

Pump capacity:
$3.14\ (2.4\ \text{in})^2 \times 4.78$ in. = 86.45 cu. in./cylinder
Total capacity = 2 x 86.45 cu. in. = 172.90 cu. in./revolution
172.90 cu. in. ÷ 1728 cu. in/cu. ft. = 0.10 cu. ft./revolution

Tank capacity:
$3.14\ (15\ \text{ft.})^2 \times 11$ ft. = 7771.5 cu. ft.

Revolutions needed to fill tank:
7771.5 cu. ft. ÷ 0.10 cu. ft./rev. = 77715 revolutions

RPM needed for 8 hours pumping time:
8 hr. x 60 min/hr. = 480 min.
77715 rev. ÷ 480 min. = 162 rev/min. (RPM)

Certification examinations scheduled for March 14

The certification examination for Class 1, 2, and 3 water distribution, water treatment and wastewater plant operators will be held concurrently in four locations on Saturday, March 14, 1981, from 10 a.m. to 2 p.m. The four locations are Butte, Havre, Kalispell, and Miles City. Specific examination sites in these towns will be announced in the next Big Sky Clearwater and also in the examination notice sent to all holders of temporary certificates on February 14.

Those wishing to take the examination must complete an application and pay the appropriate certification fee not later than February 27, 1981. Applications are available upon request from the office of the Board of Certification for Water and Wastewater Operators, Room A206, Cogswell Building, Helena, Montana 59601. Those who hold temporary certificates valid to March 14, 1981, need not pay another certification fee to take the examination but should fill out and return the examination notice detachment slip by February 27, 1981.

Annual certification fees are: Class 1 operators- $20.00; Class 2-$15; Class 3-$10; Class 4-$5; Class 5-$3. Examinations for Class 4 and 5 operators in the area of the specified examination sites will also be administered on March 14, 1981.

Watches waiting for writers

Two gold wrist watches are up for grabs again at this March's MSAWWA-MWPCA Joint Conference in Butte. One of the watches in this annual contest will go to the author of the best article on water supply treatment, and the other to the author of the best wastewater collection or treatment article. The articles may be from two to ten pages long -- including tables, figures and photographs, if necessary. The subject matter is up to you, but the papers must follow AWWA or WPCA rules.

Submit them to Dr. R.L. Sanks, Dept. of Civil Engineering, Montana State University at Bozeman 59717.

Cash prize offered for best name for workshops

Need 20 bucks?

Whoever submits the best name for a new series of workshops will win a $20 cash prize. The one-day workshops for water and wastewater operators were started by the Joint Education Committee of the Montana sections of WPCA and AWWA in co-operation with the Water Quality Bureau. The first set of workshops were presented in seven towns throughout the state last summer. The subject of those workshops was chlorination.

The goal of the committee is to present workshops on different subjects two or three times a year. The name of the workshops will be chosen and the prize awarded at the WPCA-AWWA convention in Butte this spring. The name should be short and catchy, similar to the name "Action Now" used by the Rocky Mountain Section of AWWA.

Contest entries should be sent to:
Mr. Tim Berry, chairman
Joint Education Committee
Morrison-Maierle Inc.
P.O. Box 6147
Helena, MT 59601

The next set of workshops will cover the operation and maintenance of pumps and motors. They are scheduled for late January or early February in Kalispell, Helena Havre, Great Falls, Billings and Glendive. The one-day workshops will cost $7.50 for WPCA or AWWA members and $10 for non-members. A free lunch will be provided.

If you are interested in these workshops and do not receive a notice of the time and location by the second week in January, please contact Jan Cranor or Denise Osterman, Water Quality Bureau, Room A206 Cogswell Bldg., Helena, 59601 -- phone 449-2406.

LA management program aimed at utility managers

The Water Utility Management Institute for the western states will be held March 8-13 at the University of Southern California in Los Angeles.

The institute is a five-day program conducted annually at four regional locations by the American Water Works Association (AWWA) and sponsoring universities for top-level water utility management personnel. It is designed to enable directors and division heads to meet the complex demands and challenges confronting water utility systems and provides a broad spectrum of leadership, managerial and motivational techniques. Participants will receive nationally-recognized Continuing Education Units.

Registration fees for the program is $325 per person. Registration information may be obtained by contacting Dr. Carol Kovach, director of the Office of Program Development, USC, 3716 South Hope Street, Room 388, Los Angeles 90007. Phone (213) 743-5311.

Large group passes certification exam

A total of 64 persons were certified as water and wastewater plant operators in Montana at the Nov. 21 meeting of the state's operator-certification board, according to D.G. Willems, board director.

Those passing certification exams given Oct. 10 in Bozeman are:

Class 1: Water Operator
Christopher Baer, Great Falls
John Barranger, Whitefish
Michael Cash, Glendive
Stephen W. Cheman, Kalispell
Carl Christensen, Billings
Robert Crane, Glendive
Leonard Custis, Billings
Charles Dickert, Helena
Karia Gerky, Havre
William Greenfield, Helena
Troy Jenrich, Colstrip
Robert Johnson, Laurel
Daniel Kandilas, Great Falls
Steve McNicol, Great Falls
Thomas Meddings, Havre
John Olson, Livingston
Christine Pelletier, Cascade
Kelly Ross, Rudyard
Jerome Smith, Livingston
Mark Zappalo, Great Falls

Class 1: Wastewater Operator
Patrick Carey, Missoula
John Campbell, Polson
Dean Elliott, Bozeman
John Gilsdorf, Hardin
William Green, Billings

Michael O'Mary, Whitefish
James Patterson, Billings
Gary Root, Kalispell
Donald Sampsel, Billings
Steve Smith, Whitefish
James Stilwell, Bozeman
Leonard Willett, Helena
Stephen Wrye, Livingston

Class 1: Water-Wastewater Operator
Greg Anderson, Sidney
Brent Doney, Havre
Gregory Hochmuht, Browning
Bryan Swan, Colstrip
Alan Towlerton, Billings
Paul Wells, Whitefish

Class 2: Water Operator
Joe Dillon, Deer Lodge
Don Hinman, Baker

Class 2: Wastewater Operator
William Cramer, Lolo

Class 2: Water-Wastewater Operator
Sue Garvin, Helena
Kelly Pulse, Glendive
James Vekasi, West Glacier

Class 3: Water Operator
Greg Gill, Boulder
Donald W. Johnson, Fort Peck
Gary Nivison, Helena

Class 3: Wastewater Operator
David B. Jones, W. Yellowstone
Richard Laing, Ennis
Clifford D. Ottinger, Corvallis
Donald Periman, Great Falls
Ben Poat, Superior

Class 3: Water-Wastewater Operator
Gary Byers, Lewistown
James Cox, Broadus
Gregory Doely, Columbus
Gary Hinrichs, Three Forks
Gerald F. Mero, Deer Lodge
Dwayne H. Pearson, Browning
Donald E. Peterson, Kalispell
Peter Schendel, Helena

Class 4: Water Operator
Shigeka Clarkson, W. Yellowstone
Dale Morey, Dodson
James Strait, Miles City

Two job openings available

Libby needs a Class 1 wastewater operator. Send applications to: City Clerk, P.O. Box Z, Libby, MT. 59923.

Flathead County needs an administrator for its health department. Requirements: master's in public health and undergrad degree in health field, 3 years supervisory, consultant or administrative experience. Salary negotiable. Write Flathead Co. Health Board, c/o Sanitation Dept., 723 5th Ave. E., Kalispell, MT 59901; or call 755-5300, ext. 350.

Water Quality Bureau
Department of Health
& Environmental Sciences
Room A206, Cogswell Building
Helena, Montana 59601

6154

TO:

1,500 copies of this publication were produced at a unit cost of 33½¢ per copy, for a total cost of $507.71 which includes $384.65 for printing and $123.06 for distribution.